

REMARKS

Claim 1 has been amended to recite that the chip is made of a spark erosion resistant material. Support is found, for example, in paragraph [35]. Claim 1 has also been amended to recite that the weld portion comprises components of the chip in the amount of 20% by mass to 80% by mass. Support is found, for example, in paragraph [21]. Also, the claim language has been simplified to define the extension lines shown in Fig. 6 to be imaginary extension lines of generatrices of a side surface of the protrusion, which extension lines run along the side surface of the protrusion. The subject clarifying language is not intended to change the scope of the claim. Claim 1 has been further amended to incorporate therein the recitation of claim 3, to recite that the weld portion extends a distance of D/5 or more inward of the imaginary extension lines. Claim 1 has been further amended to recite that the weld portion also extends outwardly of the subject extension lines as shown, for example, in Fig. 6. Lastly, claim 1 has been amended to recite that the part of the flange portion 1b (Fig. 2) extending outside the extension lines is entirely subsumed within the weld portion 3 as shown in Fig. 6.

Claim 3 has been canceled.

Claim 4 has been amended to correct punctuation, and to recite that the weld portion comprises components of the chip, the electrode base metal and the intermediate member, also as shown in Fig. 6.

Claim 9 has been amended to depend from claim 1.

Claims 7, 8, 10 and 11 have been canceled without prejudice.

New claim 12 recites that the weld portion has a shape and composition different from that of the flange portion, as understood from Fig. 6 and the description in paragraph [44].

New claims 13-18 including independent claims 13 and 18 are presented for the Examiner's consideration. The spark plug of claim 13 includes an intermediate member 2 connecting the ground electrode 40 and the chip 1, where the laser-weld portion extends both outwardly and inwardly from the imaginary extension lines along a side surface of the protrusion and comprises 20 to 80 % by mass of the spark erosion resistant material of the chip.

Independent claim 18 is the combination of original claims 1 and 2, where the chip is joined to the electrode base material of the ground electrode.

New claims 19 and 20 depending from claims 1 and 13, respectively, further characterize the spark erosion material. Support is found, for example, in paragraph [35].

Review and reconsideration on the merits are requested.

Claims 1-3, 6-9 and 11 were rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. 2001/0005109 A1 to Matsutani.

Matsutani was cited as meeting each of the terms of the rejected claims, including the step of laser-welding the flange portion of a firing tip to a joint face of the electrode base metal of either of the center or ground electrodes, such that the weld portion reaches inward of imaginary extension lines of generatrices of a side surface of the firing tip protrusion, citing Figs. 1 and 2 and paragraph [0010]. The Examiner further cited paragraph [0046] as disclosing the limitation of claim 3 (i.e., the weld portion is present so as to extend to a distance D/5 or more inward of the intersections as measured on the second face). As to claim 8, the Examiner cited

paragraphs [0046] and [0054] of Matsutani as disclosing that the weld portion contains components of the chip in an amount in the range of from 30% to 60% by mass.

Applicants traverse, and respectfully request the Examiner to reconsider in view of the amendment to the claims and the following remarks.

Claim 1 differs from Matsutani in that method claim 1 requires the step of tentatively joining, through resistance welding, a second face of a flange portion to a joint face of the electrode base metal which is followed by laser-welding the flange portion in step (3), whereas Matsutani discloses joining the electrode tip to the body by laser welding (paragraph [0010]), but is silent with respect to tentatively joining through resistance welding. For this reason alone, claim 1 and claims 2 and 4-6 depending therefrom are not anticipated by Matsutani and therefore define novel subject matter.

Citing Figs. 1 and 2 and paragraph [0046], the Examiner considered Matsutani as meeting claim 3 which requires the weld portion to extend to a distance $D/5$ or more inward of the extension lines. Particularly, D is defined by imaginary extension lines of generatrices of a side surface of the protrusion of the chip as shown in Fig. 6. On the other hand, although Figs. 1 and 2 of Matsutani show weld 2 extending inwardly underneath the flange portion, the weld portion perhaps touches but does not extend further inward of a vertical line extending from the side surface of the firing tip. Paragraph [0046] cited by the Examiner concerns the extent to which the flange portion extends beyond the side surface of the electrode tip, or the quantity ($D-d$). There is no mention in paragraph [0046] of the depth "s" of the weld portion relative to the root end diameter "d" which is the relationship claimed by claim 3 (as incorporated into claim 1).

Paragraph [0014] discloses that the depth of the joined portion "s" is not less than 0.1 mm and could be as much as 0.3 mm. However, the quantity "s" is measured from the outside periphery of the flange portion. Furthermore, because this passage does not relate the quantity "s" to the root diameter "d", "Matsutani also does not disclose the extent to which the weld portion 2 may extend inward of a vertical line aligned with the side surface of the electrode tip, or even that the weld portion 2 would extend into this region in the first place.

Fig. 2 of Matsutani

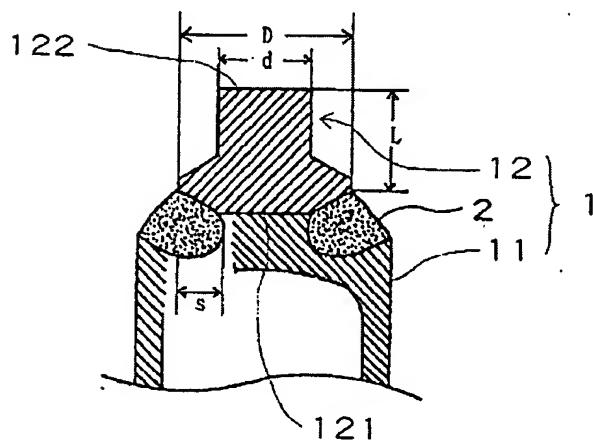
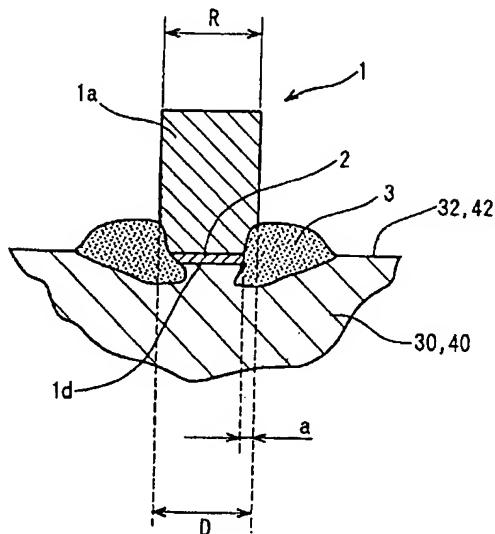


Fig. 6 of specification



Paragraphs [0046] and [0054] cited by the Examiner have nothing to do with original claim 8 (as incorporated into claim 1) and claim 9 (as amended to depend from claim 1) which require the weld portion to contain components of the chip in an amount of from 20% to 80% by mass or from 30% to 60% by mass, respectively. Paragraph [0046] describes that the electrode tip is formed from an Ir alloy containing 40% by weight of Rh, but has no disclosure with respect to the composition of the weld portion. Paragraph [0054] similarly pertains to alloys constituting

the electrode tip and has nothing to do with the composition of the weld section. As taught by Applicants' specification, the requisite composition of the weld portion is obtained by extending the weld portion inwardly a distance $D/5$ or more. This aspect of the invention also is not taught by Matsutani.

Thus, to clearly distinguish over Matsutani, claim 1 has been amended to incorporate therein the recitation of claim 3, to recite that the weld portion extends a distance $D/5$ or more inwardly of imaginary extension lines of generatrices of a side surface of the protrusion.

New claim 13 directed to a spark plug differs from Matsutani in that in Matsutani the electrode tip is joined to the center electrode (see Abstract and claim 1), whereas the spark plug of claim 13 comprises a laser-weld portion connecting the ground electrode, the tip and the intermediate layer. This is also the distinction of claim 2 (the joint face is located on the electrode base metal of the ground electrode) and claim 4 (providing an intermediate member), which intermediate member is also not disclosed by Matsutani.

Because the present claims differ from Matsutani with respect to one or more elements thereof, it is respectfully submitted that the claims define novel subject matter and withdrawal of the foregoing rejection under 35 U.S.C. § 102(b) is respectfully requested.

Claims 4, 5 and 10 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Matsutani in view of U.S. Patent 4,581,558 to Takamura et al. Takamura et al. was cited as disclosing an intermediate layer arranged between the firing tip and electrode base metal so as to reduce thermal stress. Regarding present claim 4 which requires the intermediate member to have a face larger than the second face of the flange portion, the Examiner considered that

although not shown by Takamura et al., such modification would have been within the level of ordinary skill.

Applicants respond as follows.

The Examiner considered that such feature would have involved a mere change in the size of a component and is therefore an obvious modification. However, the subject limitation concerns the size of one component relative to the other (rather than the size of a component), and the Examiner has not explained why such feature would have been obvious or even apparent to one of ordinary skill.

Furthermore, Applicants rely on the response above with respect to the rejection over Matsutani alone. For example, Takamura et al. does not show a laser-weld portion extending both outwardly and inwardly from imaginary extension lines of generatrices of a side surface of the protrusion as required by the main claims, and withdrawal of the foregoing rejection under 35 U.S.C. § 103(a) is respectfully requested.

Withdrawal of all rejections and allowance of claims 1, 2, 4-6, 9 and 12-20 is earnestly solicited.

In the event that the Examiner believes that it may be helpful to advance the prosecution of this application, the Examiner is invited to contact the undersigned at the local Washington, D.C. telephone number indicated below.

AMENDMENT UNDER 37 C.F.R. § 1.111
U.S. Application No. 10/695,796

Q78216

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Respectfully submitted,



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